



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/044,014	01/11/2002	Kuei-Hung Lee	67,200-620	7480

7590 09/10/2004

TUNG & ASSOCIATES
Suite 120
838 W. Long Lake Road
Bloomfield Hills, MI 48302

EXAMINER

BRAHAN, THOMAS J

ART UNIT	PAPER NUMBER
3652	

DATE MAILED: 09/10/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/044,014

Applicant(s)

LEE, KUEI-HUNG

Examiner

Thomas J. Brahan

Art Unit

3652

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 June 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 and 4-18 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1 and 4-18 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

Art Unit: 3652

1. In view of the newly discovered reference of Oka et al, prosecution is hereby reopened.
2. The following is a quotation of 35 U.S.C. § 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. § 103, the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 C.F.R. § 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of potential 35 U.S.C. § 102(f) or (g) prior art under 35 U.S.C. § 103.

3. Claims 1 and 4-13 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Shamlou et al in view of Chen et al. Shamlou et al shows the basic claimed apparatus for transporting a semiconductor wafer from one position to another position comprising:

an end effector having a base portion and at least one finger extending from the base portion, the finger having a top surface and a bottom surface and the finger including a free end, and wherein the top surface includes a substantially flat portion extending from the base portion, and wherein the finger includes a tapered portion (114) extending from the substantially flat portion towards the free end;

wherein the tapered portion includes an angled surface formed at an angle ranging from about 10-30 degrees with respect to the substantially flat portion; and

wherein thickness of the finger between the substantially flat portion of the bottom surface ranges from about 1.3 mm.

The dimensions of the blade of Shamlou et al vary slightly from those recited in claim 1, as the claim recites a taper angle of about 2-8 degrees, and Shamlou has a taper angle of 10-30 degrees, and the claim recites a blade thickness of about 1.8-1.95 mm, and Shamlou has a blade thickness of 1.3 mm. However determining the optimal blade angle taper and the blade thickness for a desired application are well known design parameters. Chen et al shows another wafer handling blade arrangement and teaches that as the diameter of the wafer is increased or decreased, the thickness of the wafer support blade and the angle of its tapered portion can be varied, see column 3, lines 11-14. Therefore it would have been obvious to one of ordinary skill in the art to modify the thickness of the blade and the angle of the taper of the wafer handling blade of Shamlou et al as the dimensions of the intended wafer change, as this is a well known design consideration dependent upon the wafer being processed, as taught by Chen et al. Note that Chen et al specifies increasing or decreasing the wafer size as to increase or decrease the taper dimensions and the blade thickness. The large central portion (101) can be considered as a single finger, as recited in claim 4. The two small portions adjacent tips (114) can be considered

Art Unit: 3652

as two fingers, as recited in claim 5. The teaching of modifying the taper angle based upon desired usage would include angles within a range of between 4-5 degrees, as recited in claim 6, as well as to taper length of 3-8 mm, as recited in claim 7. Shamlou et al has vacuum ports (118), as recited in claim 8. Shamlou et al discloses making the blade from a ceramic material, see column 9, lines 43-45, as recited in claim 9, or of metal or silicon carbide, see column 10, lines 20-27, as recited in claims 10-12, or from aluminum, see column 15, lines 3-24, as recited in claim 12. The end effector is moved by a robot, as recited in claim 13.

4. Claims 14 and 17 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Oka et al in view of Shamlou et al. Oka et al shows an apparatus comprising:

a robot having a robot arm for movement in a plurality of directions, and an end effector (5) secured to an end of the robot arm;

a wafer cassette housing (Ca) having first and second side walls and a plurality of spaced apart ledges (at 92; see figure 6B) extending inwardly from each of the side walls constructed and arranged so that corresponding ledges on each side wall are positioned to support a semiconductor wafer, and the housing having a front face with an opening formed therein for loading and unloading the cassette housing with semiconductor wafers;

at least two spaced apart adjacently positioned semiconductor wafers (W1 and W2) supported by corresponding ledges extending inwardly from the first and second side walls of the wafer cassette housing to define an opening between adjacently positioned semiconductor wafers; and

an end effector (5) having at least one extension (at 5c) wherein each extension includes a top surface and a bottom surface and the extension having a free end, the top surface having substantially flat portion, wherein the thickness of the extension between the substantially flat portion and the bottom surface is about 0.05-0.2 mm less than the opening between the adjacently positioned semiconductor wafers in the cassette housing. Note that Oka et al has different clearance ranges for the different operating modes that are shown in figures 9A-9D and 10A. The mode of figure 9C has the wafers positioned at a clearance in a range between 2.1 mm and 3.1 mm. As the end effector of Oka et al has a thickness of 2.5 mm, Oka et al discloses a range of negative 0.4 mm through 0.6 mm for the difference between the thickness of the extension and the wafer spacing, as to include the range of 0.05-0.2 recited in the claim.

Oka et al varies from the claims by not having a tapered portion on the free end of the end effector. Shamlou et al shows a similar wafer handling blade arrangement with a tapered end portion (114) as to avoid abrasion between the front of the blade and wafer, see column 10 line 59 through column 11, line 12. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the end effector (5) of Oka et al by tapering the front face (at protrusion 5a) as to avoid contact between the end effector and the wafers, to prevent wafer damage, as taught by Shamlou et al. It would further have been obvious to form the end effector with a pair of spaced extensions, as also taught by Shamlou et al, see the two extensions (114) in figure 1, as to a further lessen the contact surfaces between the wafer blade edge and the wafer, to prevent wafer damage.

Art Unit: 3652

5. Claims 14-16 and 18 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Oka et al in view of Chen et al. As detailed above, Oka et al shows the basic claimed combination, but varies from the claims by not having a tapered portion on the distal end of the end effector. Chen et al shows a similar wafer handling blade arrangement with a tapered end portion as to avoid contact with the wafers along a line, see column 4, lines 2-9. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the end effector (5) of Oka et al by tapering the front face (at protrusion 5a) as to lessen contact between the end effector and the wafers, to prevent wafer damage, as taught by Chen et al. As Chen et al teaches varying the wafer taper of the end of the blade based upon wafer size, see column 3, lines 11-20, it would have been obvious to one of ordinary skill in the art to use an angle in the range of 2-8 degrees, recited in claim 15, in a range of 4-5 degrees as recited in claim 16, or with the tapered portion length in a range of 3-8 mm, as recited in claim 18, as these dimensions are similar to those disclosed for the tapering taught by Chen et al, and Chen teaches varying these dimensions based upon the wafer to be processed.

6. Applicant argues in the appeal brief that the rejection ignores the limitation of the angled surface at 4-5 degrees with respect to the flat portion. This argument is not understood. The rejections have always stated that the angle disclosed by Shamlou et al approximates the claimed angle, as an angle of 10 degrees is included in the range disclosed for the tapered portion of Shamlou et al. The rejections also include modifying this angle, including using the teachings of the secondary reference of Chen et al which modifies the taper of the end face for increasing or decreasing wafer sizes. Chen et al clearly teaches varying the taper of a wafer blade based upon intended wafer the blade is intended to be used with.

7. An inquiry concerning this communication should be directed to Thomas J. Brahan at telephone number (703) 308-2568. The examiner's supervisor, Ms. Eileen Lillis, can be reached at (703) 308-3248. The fax number for all patent applications is (703) 872-9306.



Thomas J. Brahan
Primary Examiner
Art Unit 3652